

# Fenestration Testing Laboratory, Inc.

10235 8<sup>th</sup> Street, Rancho Cucamonga, CA 91730

Report #: T23-105

## REPORT SUMMARY

### REPORT #

T23-105

### TESTED FOR

Fleetwood Windows and Doors

1 Fleetwood Way

Corona, CA 92879

### SERIES & PRODUCT TYPE

450-T - THERMALLY BROKEN ALUMINUM CASEMENT WINDOW

### CONFIGURATION

X

### FRAME SIZE

914.40 mm x 1828.80 mm (36.00" x 72.00")

### SPECIFICATION

NAFS - North American Fenestration Standard/specification for windows, doors, and skylights  
AAMA/WDMA/CSA 101/1.S.2/A440-22

CSA A440S1:19 Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440

### PRIMARY DESIGNATOR

CLASS LC-PG40 914.40 x 1828.80 mm (36.00 x 72.00 in) Type: C

### TEST COMPLETION DATE

December 11, 2023

### REPORT DATE

December 13, 2023

# Fenestration Testing Laboratory, Inc.

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Report #: T23-105

**1.0 Tested For:** Fleetwood Windows and Doors  
1 Fleetwood Way  
Corona, CA 92879

**2.0 Purpose:**

The purpose of this report is to present the testing methods employed and the test results obtained during the performance testing of one (1) THERMALLY BROKEN ALUMINUM CASEMENT WINDOW described in paragraph 5.0 of this report.

**3.0 Test References:**

- 3.1** NAFS - North American Fenestration Standard/specification for windows, doors, and skylights AAMA/WDMA/CSA 101/I.S.2/A440-22
- 3.2** CSA A440S1:19 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440
- 3.3** ASTM F 588-17 Forced Entry Resistance Tests for Windows
- 3.4** CAWM 301-90(1995) Forced Entry Test for Windows (CMBSO 1-79)

**4.0 Compliance Statement:** The test results in paragraph 6.0 indicate that the test sample described in paragraph 5.0 of this report met the performance requirements of the above specifications for the performance grade shown in 4.1 below.

**4.1** CLASS LC-PG40 914.40 x 1828.80 mm (36.00 x 72.00 in) Type: C

**5.0 Sample Submitted:**

**5.1 Product Type:** THERMALLY BROKEN ALUMINUM CASEMENT WINDOW

**5.2 Series:** 450-T

**5.3 Configuration:** X

<b>5.4 Product Dimensions:</b>	<b>Millimeters</b>	<b>Inches</b>
Total Frame:	914.40 x 1828.80	36.00 x 72.00
Active (Vent) sash:	898.65 x 1813.05	35.38 x 71.38

**5.5 Glass and Glazing:**

<i>IGU Thickness</i>	<i>Spacer Size</i>	<i>Interior Lite</i>	<i>Exterior Lite</i>	<i>Glazing method</i>
1" overall wide	5/8"	3/16" Annealed	3/16" Annealed	Outside glazed onto hollow bulb vinyl. A sealant bead was applied parallel to the bulb vinyl 5" each way at each corner. Rubber setting blocks 3/8" high were set at quarter points on the vent bottom . Aluminum glazing stop applied full perimeter on the outside of the IGU. Each stop contained a strip of hollow bulb vinyl.

**5.6 Weepage:**

<i>Drainage Method</i>	<i>Size</i>	<i>Quantity</i>	<i>Location</i>
Weep notch	1" x 3/16"	One (1) at each end	Two outer sill legs were notched. The bulb vinyl on the vent was notched in line with each sill weep notch.
Vertical round weep	0.31" diameter	One (1) at each end	Vent bottom rail.

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## 5.7 Pressure balancing: None

## 5.8 Weather-stripping:

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
Hollow bulb vinyl (BOM item 7)	Two (2) strips	Frame inside leg - one strip full perimeter facing out. Vent sash - one strip full perimeter facing in.
Hollow bulb vinyl (BOM item 6)	Two (2) strips	Same as listed under "Glass and Glazing". One strip was on the vent glazing leg facing out and the other strip on the glass stops.
Foam seal bulb (BOM item 8)	One (1) strip	One strip on the sill, head, and hinge jamb.

## 5.9 Sealants:

Sealant was applied at the following locations:

- Vent and frame corners were sealed full profile.
- Aluminum sill pan was set in sealant to the rough opening and the window sill was set into the sill pan on a bead of sealant.
- The roto-operator housing was sealed to the sill with a rubber gasket.
- The locks were sealed with adhesive foam gasket to their respective jamb.
- All staked locations were sealed.
- Sealant at glazing described under "Glass and Glazing"

## 5.10 Hardware:

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
Metal cam lock/pull handle and strike	One (1)	Located on vent lock stile 19.5" from the bottom of stile. It was fastened with a pair of #10 x 3/8" PFH screws applied from the outside prior to glass installation. When locked, the tongue of the lock engaged a metal strike with PVC pad that was fastened to the lock jamb with a pair of #6 screws.
Metal four point lock	One (1)	The lock jamb - One four point lock was located 9.25" up from the lock jamb. The lock housing fit into a fabricated hole in the lock jamb and was fastened to it with a pair of #10 x 3/8" PH screws applied from the outside, through an aluminum retainer and into screw races in the lock housing. The lock had a cam handle linked to a metal slide rod. The slide rod was supported by eight nylon retainer/guides. Each retainer was fastened to the lock jamb with a pair of #8 x 3/4" PPH screws. The slide rod contained four lock pins that engaged their respective metal keeper located at 4", 25", 45.5" and 66" from the bottom of the stile. Each keeper was fastened to the stile with four #8 x 1/2" PFH screws.
4 bar friction hinge	Two (2)	The sash was supported in the frame with a 4 bar friction hinge in the sill and head. Each hinge was fastened to the frame with three #10 x 3/8" PPH screws. A 1/8" aluminum shim plate was set between each hinge and the frame. Each hinge was fastened to its respective vent top or bottom rail with four #10 x 1/2" PPH screws.
Metal snubbers	Two (2) pair	A pair of snubbers was located on the vent hinge stile and frame hinge jamb 18" from each end. Each snubber on the frame was fastened with a pair of #10 x 1/2" PPH screws and each snubber on vent hinge stile was fastened with a pair of #10 x 3/8" PPH screws.
Pivot Shims	One (1) pair	A PVC pivot shim was fastened to the sill 1.75" from the locking side with a single #8 x 3/4" PFH screw and its corresponding pivot shim pair was fastened to the vent bottom rail to level the sash as it closed.

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## 5.11 Construction:

<i>Location</i>	<i>Joinery Type</i>	<i>Number of Fasteners</i>	<i>Fastener Size</i>
Frame corners	Mitered, keyed with two keys, staked. Also, each corner had 1" weld bead.	N/A	N/A
Vent corners	Mitered, keyed with two keys, staked. Also, each corner had 1" weld bead.	N/A	N/A

## 5.12 Reinforcement: None

## 5.13 Installation:

<i>Location on frame</i>	<i>Anchor type</i>	<i>Spacing</i>
The rough opening was constructed with 2" x 6" lumber doubled on all four sides. The window was fastened to it with screws through the nail on fins full perimeter.	#8 x 1.5" PFH	6.5" from each end and 16" on center.

**6.0 - Test procedures and results:** All testing procedures were performed in accordance with the performance requirements of the test specifications referenced in paragraph 3.0 of this report. The number preceding each test listed below refer to the corresponding sections in the NAFS.

### 8.3.1 - Operation Force (ASTM E2068-00(2016))

<b>Test Description</b>	<b>Results</b>	<b>Allowed</b>	<b>Comments</b>
Maximum force to initiate or maintain motion	75.17 N (16.90 lbf)	155 N (35.0 lbf)	1
Latching device force	80.06 N (18.00 lbf)	100 N (22.48 lbf)	

### 8.3.2 - Air Infiltration (ASTM E283-19)

<b>Test Description</b>	<b>Results</b>	<b>Allowed</b>	<b>Comments</b>
75 Pa differential pressure	1.25 L/s*m <sup>2</sup>	1.5 L/s*m <sup>2</sup>	
1.57 psf differential pressure	0.25 cfm/ft <sup>2</sup>	0.30 cfm/ft <sup>2</sup>	
The tested specimen exceeds the performance levels specified in AAMA/WDMA/CSA 101/1.S.2/A440 for air leakage resistance.			
The tested specimen exceeds Canadian Supplement CSA A440S1:19 A2 level for air leakage resistance.			

### 8.3.2 - Air Exfiltration (ASTM E283-19)

<b>Test Description</b>	<b>Results</b>	<b>Allowed</b>	<b>Comments</b>
75 Pa differential pressure	1.20 L/s*m <sup>2</sup>	1.5 L/s*m <sup>2</sup>	
1.57 psf differential pressure	0.24 cfm/ft <sup>2</sup>	0.30 cfm/ft <sup>2</sup>	
The tested specimen exceeds the performance levels specified in AAMA/WDMA/CSA 101/1.S.2/A440 for air leakage resistance.			
The tested specimen exceeds Canadian Supplement CSA A440S1:19 A2 level for air leakage resistance.			

### 8.3.3 - Water Penetration (ASTM E547-00(2016))

<b>Test Description</b>	<b>Results</b>	<b>Allowed</b>	<b>Comments</b>
DP40 - 290 Pa (6.06 psf)	No water penetration	No water penetration	2

### 8.3.4.2 - Uniform Load Deflection at Design Pressure (ASTM E330-14)

<b>Test Description</b>	<b>Results</b>	<b>Allowed</b>	<b>Comments</b>
DP40 - 1920 Pa (40.10 psf)Pos	0.00 mm (0.00")	Report only	3
DP40 - 1920 Pa (40.10 psf)Neg	0.00 mm (0.00")	Report only	3

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### 8.3.4.3 - Uniform Load Structural Overload (OL) at 1.5 x Design Pressure (ASTM E330-14)

Test Description	Results	Allowed	Comments
OL for DP40 - 2880 Pa (60.15 psf)Pos	0.00 mm (0.00")	3.56 mm (0.14")	3
OL for DP40 - 2880 Pa (60.15 psf)Neg	2.79 mm (0.11")	3.56 mm (0.14")	3

### 8.3.5 - Forced Entry Resistance (ASTM F588-17 & CAWM 301-90(1995))

Test Description	Results	Allowed	Comments
ASTM F588 Type B and CAWM 301 Type II	No Entry	No Entry	4

### 8.3.6.6 - Casement Hardware Load Test

Test Description	Results	Allowed	Comments
LC - 300 Pa (6.27 lbf) per unit area of vent.	Pass	No damage & continues to operate normally	

Comment #1 - The window met the requirements of the Canadian Supplement CSA A440S1:19 for operating force.

Comment #2 - Internal screen not a factor in testThe window met the requirements of the Canadian Supplement CSA A440S1:19 for Water penetration resistance.

Comment #3 - Deflection measurement taken between snubber points on the hinge jamb.

Comment #4 - Forced entry resistance per ASTM F588 grade 10.

Testing was witnessed by: Jim Cruz with FTL.

For a complete description of the tested sample, refer to the attached three (3) pages consisting of bill of materials, cross section drawings, and die drawings. This report is complete only when all the above referenced bill of materials and drawings are attached.

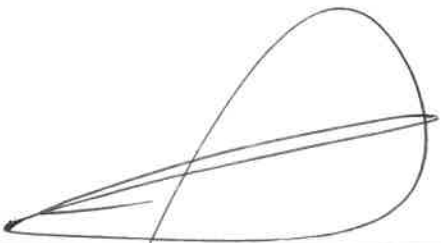
The bill of materials, cross section drawings, and die drawings of frame and sash members are on file and have been compared to the sample submitted. Test sample sections, bill of materials, drawings and a copy of this report will be retained at the test laboratory for four years.

This test report may not be modified in any way without the written consent of Fenestration Testing Laboratory, Inc (FTL).

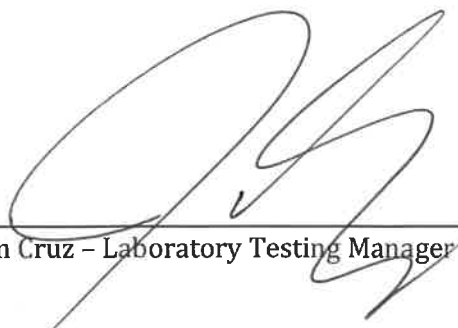
The preceding test results relate only to the tested specimen and were obtained by using the applicable test methods listed in section 3.0 and 6.0 above. This report does not constitute certification of this product or an endorsement by this laboratory. It is the property of the client named in section 1.0 above. Certification can only be granted by an approved administrator and/or validator.

**Test Completion Date:** December 11, 2023

**Report Completion Date:** December 13, 2023



Pete Cruz - Test Engineer



Jim Cruz - Laboratory Testing Manager

**TEST SPECIMEN DESCRIPTIONS**

- SERIES / MODEL: Series 450-T
- PRODUCT TYPE: AWNING, CASEMENT, FIXED.

**GENERAL NOTES**

- BUCKING OPENINGS & BUCKING FASTENERS MUST BE PROPERLY DESIGNED & INSTALLED TO TRANSFER LOADS TO THE STRUCTURE AND TO BE REVIEWED BY BUILDING OFFICIAL
- ALL HARDWARE & FASTENERS SHALL BE IN ACCORDANCE WITH THESE DRAWINGS & MAY NOT VARY UNLESS SPECIFICALLY MENTIONED ON THE DRAWINGS.
- MATERIALS, INCLUDING BUT NOT LIMITED TO STEEL SCREWS, THAT COME INTO CONTACT WITH OTHER DISSIMILAR MATERIALS SHALL MEET THE REQUIREMENTS OF AAMA AND FLORIDA BUILDING CODE.

**SPECIFICATIONS**

- AAMA/WDMA/CSA 101/1.S.2/A440
- A440 S1 (CANADIAN SUPPLEMENT)



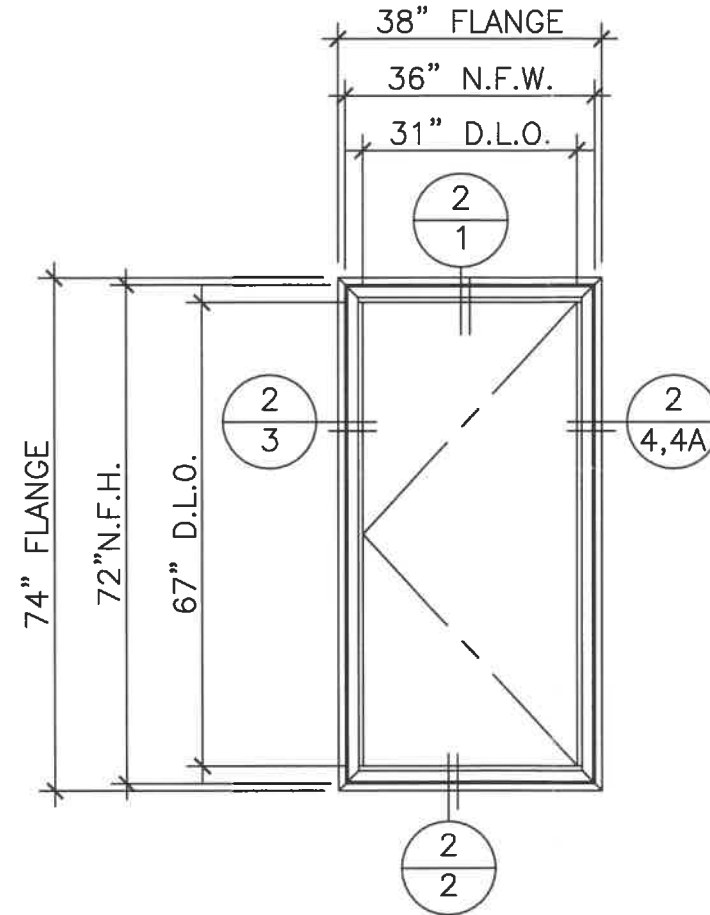
**CORNERS CONSTRUCTION**

- 1.SERIES 450-T  
1.1.MITERED, WELD ALONG INNER MITER, AND CRIMPED AT THE OUTER CORNERS. SEE BOM ITEM 19 & 20.

**ANCHOR SCHEDULE**

- OPENING TYPE (SUBSTRATE): 2X- WOOD FRAME, STEEL STUD, CONCRETE
- FRAME: NO. 10 SCREW, 8" FROM END, 16" O.C. MAX.  
MINIMUM EMBEDMENT: 1 1/2"  
MINIMUM EDGE DISTANCE: 3/4"

GLAZING : SEE PAGE 3



- 1 C-PROJECTED  
Series 450-T  
QTY: 1  
GLASS: 1"; 5mm, A.S., 5mm-R
- NOTES:  
1. NAIL-ON FRAME  
2. 4-BAR HINGES  
3. MULTI-POINT, CAM HANDLE  
4. (2) SNUBBERS
- SPEC 1: A440

*FRAME ANCHOR REQUIREMENTS TABLE			
OPENING TYPE (SUBSTRATE)	FRAME TO OPENING FASTENER TYPE	MINIMUM EMBEDMENT	MINIMUM EDGE DIST.
2X- WOOD FRAME OR BUCK	(1) NO. 8 SMS SCREW	1 1/2"	3/4"
MIN. 18 GA. 33 KSI STEEL STUD	(1) NO. 8 SMS SCREW	FULL	3/8"
CMU/CONCRETE	(2) 3/16" CONCRETE SCREWS	1 1/4"	2 5/8"

(1) SMS SCREWS  
(2) CONCRETE SCREWS SHALL BE 3/16" ITW TAPCON

**FENESTRATION TESTING LAB**  
REPORT NO: T23-105  
DATE: 12/13/23

1 FLEETWOOD WAY  
CORONA, CA 92879  
www.fleetwoodusa.com

**FLEETWOOD**  
WINDOWS & DOORS

SCALE :  
N.T.S.

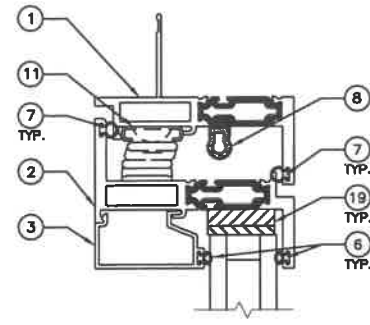
DRAWING NO. :  
**(1)**

SHEET :  
1 OF 3

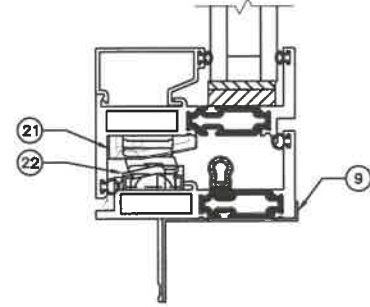
NOTES: PROJECT #: FLEETWOOD WINDOWS AND DOORS  
JOB NAME: 450-T TESTING

DATE: 12/17/23  
JOB NUMBER: 566786

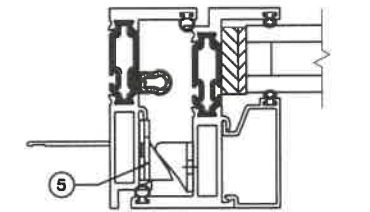
DRAWN BY: CJ  
REVISIONS: DATE: DRAWN BY: COMMENTS:



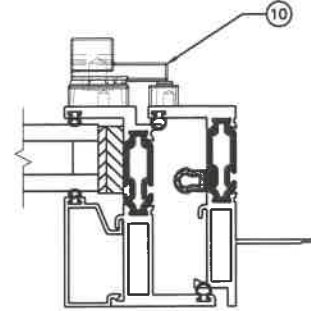
1 NAIL-FIN 4-BAR HEAD  
SCALE: FULL SIZE



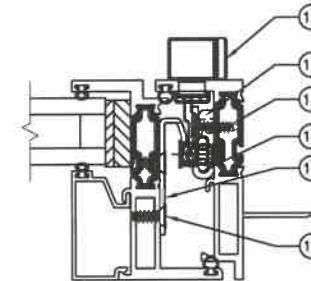
2 NAIL-FIN 4-BAR SILL  
SCALE: FULL SIZE



3 NAIL-FIN 4-BAR JAMB  
SCALE: FULL SIZE



4 NAIL-FIN CAM HANDLE JAMB  
SCALE: FULL SIZE



4A NAIL-FIN CAM HANDLE JAMB  
SCALE: FULL SIZE

**FENESTRATION TESTING LAB**  
 REPORT NO: T23-103  
 DATE: 12/13/23

1 FLEETWOOD WAY  
CORONA, CA 92879  
www.fleetwoodusa.com

**FLEETWOOD**  
WINDOWS & DOORS

SCALE :  
N.T.S.

DRAWING NO. :  
(2)

SHEET :  
2 OF 3

NOTES: PROJECT #:

CUSTOMER: FLEETWOOD WINDOWS AND DOORS  
JOB NAME: 450-T TESTING

DRAWN BY: CJ

DATE: 12/7/23

JOB NUMBER: 566766

COMMENTS

DRAWN BY

DATE

REVISIONS

